at1124exam: Radicals and Squares (v803)

Question 1

Simplify the radical expressions.

$$\sqrt{27} \qquad\qquad \sqrt{8} \qquad\qquad \sqrt{18}$$

$$\sqrt{3 \cdot 3 \cdot 3} \qquad\qquad \sqrt{2 \cdot 2 \cdot 2} \qquad\qquad \sqrt{3 \cdot 3 \cdot 2}$$
$$3\sqrt{3} \qquad\qquad 2\sqrt{2} \qquad\qquad 3\sqrt{2}$$

Question 2

Find all solutions to the equation below:

$$\frac{(x+8)^2}{4} - 3 \;=\; 6$$

First, add 3 to both sides.
$$\frac{(x+8)^2}{4} = 9$$

Then, multiply both sides by 4.
$$(x+8)^2 = 36$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 8 = \pm 6$$

Subtract 8 from both sides.
$$x = -8 \pm 6$$

So the two solutions are $x = -2$ and $x = -14$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 14x = 72$$

$$x^2 - 14x + 49 = 72 + 49$$
$$x^2 - 14x + 49 = 121$$
$$(x-7)^2 = 121$$
$$x - 7 = \pm 11$$
$$x = 7 \pm 11$$
$$x = 18 \qquad \text{or} \qquad x = -4$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 2x^2 + 28x + 90$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 + 14x) + 90$$

We want a perfect square. Halve 14 and square the result to get 49 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 + 14x + 49 - 49) + 90$$

Factor the perfect-square trinomial.

$$y = 2((x+7)^2 - 49) + 90$$

Distribute the 2.

$$y = 2(x+7)^2 - 98 + 90$$

Combine the constants to get **vertex form**:

$$y = 2(x+7)^2 - 8$$

The vertex is at point $(-7, -8)$.